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ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST P.A.
1401 CITRUS CENTER 255 SOUTH ORANGE AVENUE
P.O. BOX 3791
ORLANDO, FL 32802-3791

EXAMINER	
SUCHECKI, KRYSTYNA	
ART UNIT	**PAPER NUMBER**
2882	

DATE MAILED: 04/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/977,065	Applicant(s) BHARDWAJ ET AL.	
	Examiner Krystyna Suchecki	Art Unit 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39,41,44 and 45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *41* is/are allowed.

6)☒ Claim(s) *1-7,9-11,13-20,22-24,26-33,35-37, 39 and 44-45* is/are rejected.

7)☒ Claim(s) *8, 12, 21, 25, 34 and 38* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The declaration filed on 12/15/03 under 37 CFR 1.131 is sufficient to overcome the Klekamp reference.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-4, 6-7, 9-11, 13-17, 19-20, 22-24, 26-30, 32-33, 35-37, 39 and 44-45 are rejected under 35 U.S.C. 102(b) as being anticipated by Bhagavatula (US 5,125,946).

4. Regarding Claims 1, 14 and 27, Figure 7 of Bhagavatula ('946) teaches a planar lightwave circuit, and therefor methods for forming and balancing stress in same, comprising at least one optical waveguide core (5); at least one feature (6, 4) proximate the core having at least one stress- engineered property to balance stress and therefore minimize birefringence affecting the core; and a protective passivation layer (9) formed over the core and the feature, the passivation layer formed to be substantially non-interfering with the balanced stress affecting the core provided by the feature. This is implied since materials for the device are selected so as to match thermal and mechanical properties amongst the materials (Column 3, lines 29-31 and 52-53), which is interpreted to mean that stress is balanced in the device based upon that selection. Also, minimized birefringence is implied, since birefringence is absent until it is forcibly presented in the device by alternative manipulations (Column 7, lines 62-64).

5. Regarding Claims 2, 15 and 28, '946 teaches a planar lightwave circuit and methods wherein the at least one feature comprises an overcladding layer (6) formed over the core (5), and doped to balance stress affecting the core (Column 3, lines 29-31 and 52-53).

6. Regarding Claims 3, 16 and 29, '946 teaches a planar lightwave circuit and methods further comprising: a substrate (1); and an undercladding (4) formed over the substrate and under the core (5); wherein the overcladding is doped (Column 3, lines 24-58) to have a coefficient of thermal expansion approximately matched to that of the substrate to thereby symmetrically distribute stress in the undercladding between the overcladding and the substrate, and therefore away from the core (Column 3, lines 29-31 and 52-53).

7. Regarding Claims 4, 17 and 30, '946 teaches a planar lightwave circuit and methods wherein the protective passivation layer (9) is formed to have a coefficient of thermal expansion approximately matched to that of the overcladding such that it is substantially non-interfering with the balanced stress affecting the core provided by the overcladding (Column 3, lines 29-31 and 52-53). This is implied since Boron (Column 6, lines 51-66) is a known ingredient in passivation materials and passivation materials are defined to be passive and non-interfering.

8. Regarding Claims 6, 9, 13, 19, 22, 26, 32, 35 and 39, '946 teaches a planar lightwave circuit and methods wherein the at least one feature comprises portions of the undercladding (4), respectively adjacent to each lower edge of the core (5), terminating at a point lower than the core, to further effect a removal of stress away from the core. This

is implied since material selections are made in order to minimize stress in the device (Column 3, lines 29-31 and 52-53).

9. Regarding Claims 7, 11, 20, 24, 33, and 37, '946 teaches a planar lightwave circuit and methods wherein the at least one feature comprises a stress release groove formed through the overcladding (6) between two cores (5) of the at least one core, the stress release groove releasing and therefore balancing stress affecting the two cores. This is implied since material selections are made in order to minimize stress in the device (Column 3, lines 29-31 and 52-53) and also since the use of grooves for the purpose of relieving stress between cores is a known reason to use grooves in the art (Column 4, lines 58-61).

10. Regarding Claims 10, 23 and 36, '946 teaches a planar lightwave circuit and methods wherein the lower point corresponds with the bottom of the stress release groove to thereby provide an identifiable etch transition point for the stress release groove. This is understood since etching occurs to the bottom of the groove (Column 4, lines 40-43).

11. Regarding Claims 44-45, Figures 5, 6 and 7 of '946 teaches a method for forming a planar lightwave circuit, comprising: providing a substrate (1) and a waveguide undercladding (4) formed thereover; forming a waveguide core material layer (5) over the undercladding; etching portions of the waveguide core material away to form at least two waveguide cores, said etching proceeding into the undercladding between the two cores, to a point lower than the lower surfaces of the cores; filling the etched portions with a waveguide overcladding (9); wherein the lower point of the undercladding between the cores relieves stress and resulting birefringence from the cores; and wherein the distance between the point and the lower surfaces of the cores is proportional to the amount of

stress relieved from the cores. The feature that a distance between the point and the lower surfaces of the cores is proportional to the amount of stress relieved from the cores is implied, given the statements that stress is balanced in the system by both grooves (Column 4, lines 58-61)and material selections (Column 3, lines 29-31 and 52-53).

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claims 5, 18 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhagavatula in view of Kawachi (US 4,900,112).

14. Regarding Claims 5, 18 and 31, Bhagavatula teaches flexibility in doping materials to effectuate balanced stress and proper optical waveguiding in a lightwave circuit (Column 3, line 24- Column 4, line 4 and Column 6, line 51-66). Bhagavatula states that other dopant levels are required for other ways of operating the waveguide device (Column 6, lines 51-66).

15. Bhagavatula fails to teach a planar lightwave circuit, or methods for forming and balancing stress in same, wherein the passivation layer comprises silicon nitride.

16. Kawachi teaches that silicon nitride is a known expedient for passivation techniques in order to provide high reliability and protection to an optical device so that it is not modified by moisture in the air (Column 16, lines 14-25).

17. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use silicon nitride for a passivation material in the device

and methods of Bhagavatula as taught by Kawachi, since Bhagavatula offers flexibility in material selection and Kawachi teaches that silicon nitride is a known expedient for passivation techniques in order to provide high reliability and protection to an optical device so that it is not modified by moisture in the air (Kawachi, Column 16, lines 14-25).

Allowable Subject Matter

18. The indicated allowability of claims 5, 7, 9-11, 18, 20, 22-24, 31, 33 and 35-37 is withdrawn in view of the newly discovered reference(s) to Bhagavatula and Kawachi. Rejections based on the newly cited reference(s) are shown above.

19. Claim 41 is allowed.

20. Claims 8, 12, 21, 25, 34 and 38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

21. The following is a statement of reasons for the indication of allowable subject matter: Claims 8, 12, 21, 25, 34 and 38 contain allowable subject matter for at least the reason that the prior art of record fails to teach or reasonably suggest a planar lightwave circuit or methods for forming or balancing stress in same wherein a second overcladding is formed along walls and a floor of the stress release groove to partially but not completely fill the groove to preserve its stress releasing property, but sufficient to support a generally planar portion of the passivation layer over the groove. Claim 41 contains allowable subject matter for at least the reason that the prior art of record fails to teach or reasonably suggest a method for forming a stress release groove in a planar lightwave circuit comprising the filling of an etched portion as combined with the

subsequent etching step as claimed. Bhagavatula teaches a groove between cladding and core elements in Figure 6, but fails to teach an additional cladding formed around the cladding and core elements such that the groove is maintained. Rather, after the processing steps, the device of Figure 6 is filled in with a passivation material (9) as shown in Figure 7. Likewise, while Kawachi teaches that grooves are used to relieve stress between cores in planar optical devices (Column 12, lines 6-16), Kawachi likewise fails to teach a planar portion of a passivation layer supported as claimed in the instant application.

Conclusion

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Patent to Caneau (US 5,732,179) is of interest for teaching stress balancing layers (14) with a passivating cap layer (66) in Figure 9. Patent to Valette (US 4,929,302) is of interest for teaching a substrate, undercladding, core, overcladding, second overcladding and passivation layer (Figure 10).

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krystyna Suchecki whose telephone number is (571) 272-2495. The examiner can normally be reached on regular working days and hours.

24. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

25. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status

information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER